



OWM402 / OWM502 / OWM602 COFDM Wireless Monitor

User's Guide & Operating Manual

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1. General

The OWM02 family of COFDM Wireless Monitors incorporates a diversity receiver and a 7" widescreen LCD. It sets itself apart from the competition by processing the wireless signal digitally all the way to the display giving sharper clearer pictures. It is ideal for demanding high-end video applications that require robust video.

The OWM02 series has been engineered with a variety of features for various applications. The 2-antenna diversity uses maximal ratio combining to mitigate fading & multipath effects. The low power consumption & the 'Quick switching' between 16 channels gives added convenience in handheld applications.

Features like OSD menu for confidence monitoring while providing independent unobstructed video output for viewing, SD card for recording and playback (optional), stereo audio amplifier with headset jack and dual power source capability enhance the products usage.

The OWM402 is a VHF/ UHF receiver, the OWM502 is a L-band receiver and the OWM602 is a S-band receiver.

NOTE

Unless explicitly stated, every reference in this document to the OWM602 also implies the OWM402 and OWM502. The main difference between the models is the frequency range.

The OWM602 receiver has the following standard channels:

A video channel (NTSC or PAL).
A stereo audio channel.

OWM family variants-

- U suffix adds a 19.2Kbps metadata channel
- EC suffix adds Encryption capability (Encryption is proprietary 40 bit)

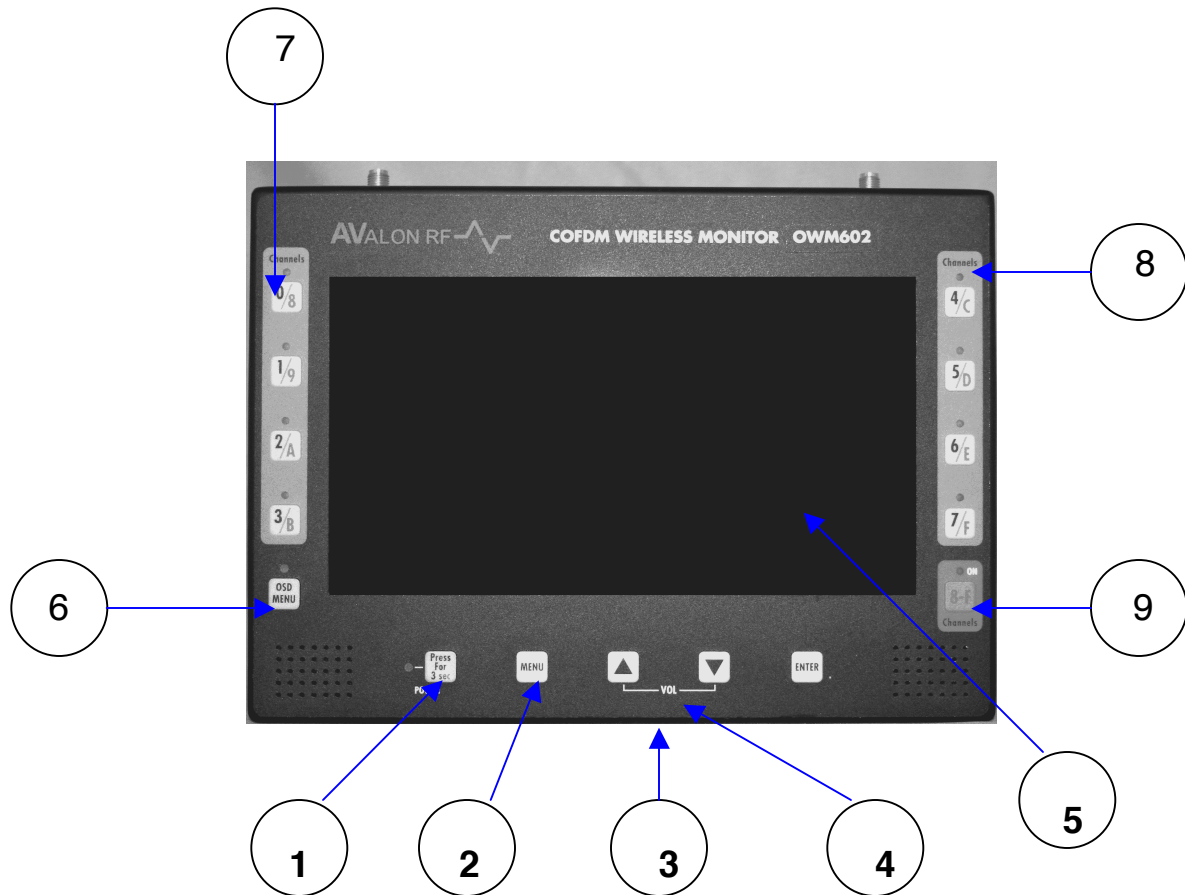


Figure A – Front Panel

OWM402/OWM502/OWM602 Controls and Indicators

- 1 - Power button**
- 2 - LCD Menu button**
- 3 - LCD Menu Navigation buttons (UP, DN and Enter)**
- 4 - Volume UP/ DN buttons**
- 5 - 7" Widescreen LCD**
- 6 - Wireless OSD Menu button**
- 7 - Channels 0-7 selection buttons**
- 8 - Channel Indicator led's**
- 9 Channels 8- F Bank select switch**

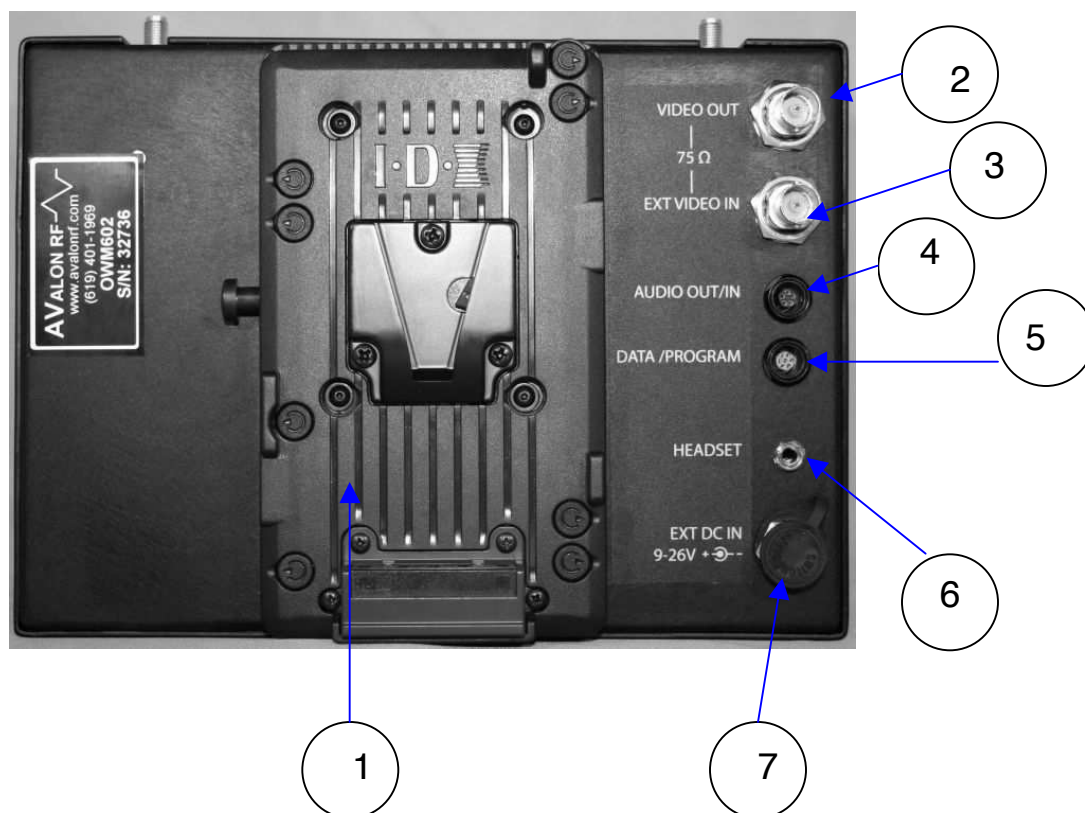


Figure B – Rear Panel

OWM402/OWM502/OWM602 Controls and Connectors

- 1 V-Mount battery adaptor**
- 2 Video Output connector**
- 3 External Video Input Connector**
- 4 Audio Output/ Audio Input Connector**
- 5 Data Output/Program Connector**
- 6 Headset Jack**
- 7 Ext DC input Jack**

2. Specifications

2.1 Frequency Range (Model Dependent).

The frequency range of each model has a base number that identifies its band. E.g 4 is UHF, 5 is L-band & so on. The 'standard' frequency ranges for the various models are as follows:

OWM402: UHF receiver with a tuning range of 450MHz-862MHz.

OWM502: L-band receiver with a tuning range of 900 MHz-1200 MHz or 1.2GHz -1.6GHz.

OWM602: S-band receiver with a tuning range of 2.1 - 2.5GHz or 2.3 – 2.7 GHz.

There can be 16 channels within the operating range. For frequency ranges other than those indicated, please contact Avalon RF sales.

2.2 Power Input –

There are 2 sources of power input to the OWM02 – The V-mount battery or the External DC Jack. The power specification is the same for both inputs.

Both power sources can be connected for uninterrupted operation and the unit is automatically powered by the higher voltage power source.

- a) The V-Mount plate (Circle 1 on rear panel control) accepts a standard Sony or IDX compatible V-mount battery. The battery is not included with the OWM602. Depending on your purchase, if the battery was supplied as a package, please refer to the battery documents for details.
- b) The External DC power input connector is a Switchcraft 2mm IP68 sealed dc jack on the rear panel of the OWM602.

Center Pin – Power + (+9.5Vdc to +20Vdc)

Ring/Sleeve – Power Return

Figure C – Power Input



A Universal input (90-240V ac) external wall adaptor is supplied with the OWM602.

- c) The OWM602 operates on a 9.5Vdc to 20Vdc unregulated voltage source with a ripple of less than 0.5Vp.p.
- d) Input Current is typically 1.2 Amps at an input voltage of 12Vdc.
- e) Power is switched ON/OFF via a front panel electronic switch.
- f) The OWM602 power input is protected against reverse polarity and also has a under voltage lock-out.

To calculate approximate run time on battery, divide the capacity of the battery by 14. e.g a 90WH (watt-hour) battery will run the OWM602 for $90/14 = 6.4$ hrs, approx 6 hours if fully charged.

2.3 Antenna Inputs, total of 2 (Circle 1 on Top panel).

The OWM602 has 2 SMA (f) inputs on the top panel for antenna connections. The input impedance is 50 ohms.

2.4 Video Output (Circle 2 on rear panel)

The OWM602 has a video output for a composite video signal. This output provides an independent video signal of the selected video source.

In 'Wireless AV' mode, the video signal is a composite output of the digital video displayed. This output is (by default) set up to be a non-OSD signal that can be connected to a TV/Monitor for unobstructed viewing of the wireless video even if OSD is turned 'on' on the handheld monitor for confidence monitoring. In 'External AV' mode, this output is a buffered loop-thru of the signal at the 'Video In' input.

Video output connector is a BNC type with a $75\ \Omega$ (ohm) impedance.

- a. Output is NTSC/PAL/RS170A/CCIR baseband from 20 Hz to 5.5 MHz for NTSC or 20 Hz – 6.5 MHz for PAL.
- b. Output amplitude is 1 Vp.p. with negative sync tips of 0.3 Vp.p.

2.5 External Video Input (Circle 3 on rear panel)

In 'External AV' mode, an external composite video signal is fed to this input. The signal can be NTSC or PAL and the 'Video Standard' must be set to the same type.

Input impedance is 75 ohm.

2.6 Audio Output/ Input (Circle 4 on rear panel)

This is a 5 pin LEMO connector located on the rear panel. It is a dual function port-

In 'Wireless AV' mode, balanced stereo audio output is available through this connector

In 'External AV' mode, balanced stereo audio input is provided through this connector.

Stereo outputs are 600 ohm balanced. Input impedance is 10kohm.

Connector pin assignment is as follows:

Pin 1 – Audio Return

Pin 2 – Left Audio + Output

Pin 3 – Right Audio + Output

Pin 4 – Right Audio - Output

Pin 5 – Left Audio - Output

LEMO ECG.0B.305.CLN
or Equivalent

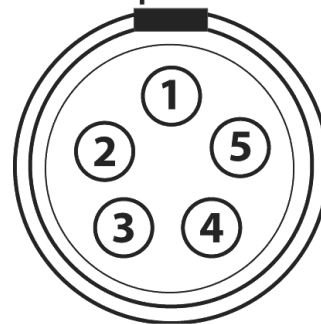


Figure D – Audio Output(s)

2.7 Program/ Data output (Circle 5 on rear panel).

The Data/ Program connector is a 7 pin LEMO type ECG.0B.307.CLN or equivalent:

The connector pin-out is:

Pin no	Signal
Pin 1	Ground
Pin 2	NC
Pin 3	NC
Pin 4	NC
Pin 5	RS232 Input
Pin 6	RS232 Output
Pin 7	Ground

LEMO ECG.0B.307.CLN
or Equivalent

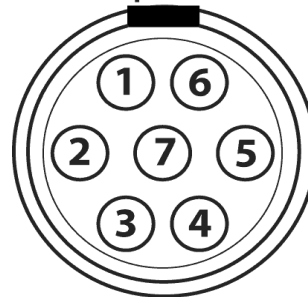


Figure E –Data/ Program Output

For units with the –U option, the metadata output is available through this connector. An interface cable is provided with the unit for connection to a serial port.

With the special programming cable, this port allows for programming the channels and other receiver parameters. Avalon does not recommend the average user to use this facility as incorrect settings may render the receiver non-functional. Only users familiar with DVB-T parameter settings should make changes to the configuration.

2.8 Headset (Circle 6 on rear panel)

The headset jack is a standard 3.5mm stereo jack. Inserting a headset jack disconnects the front panel speaker drive. Any headset with 8 to 32 ohm impedance can be used. The maximum headset power is 30mW into 16 ohms or 15mW into 32 ohms.

2.9 Size

Configuration	Dimensions
OWM602 (See Figure G)	7.8" W x 6" H x 1.8" D 200mm x 160mm x 46mm

2.10 Weight

Net Weight	3.2 lb. (1.5Kg)
Shipping weight	4 lbs. (2Kg)

2.11 Mounting Methods

The OWM02 has a bracket that allows for tripod mounting using a standard ¼-20 ANSI screw that is provided with most tripods.

NOTE

DO NOT unscrew or attempt to use any other holes other than the tripod mount for mounting purposes. Use of longer screws in these holes may short internal parts causing irreparable damage to the unit. Such action will also VOID the Warranty.

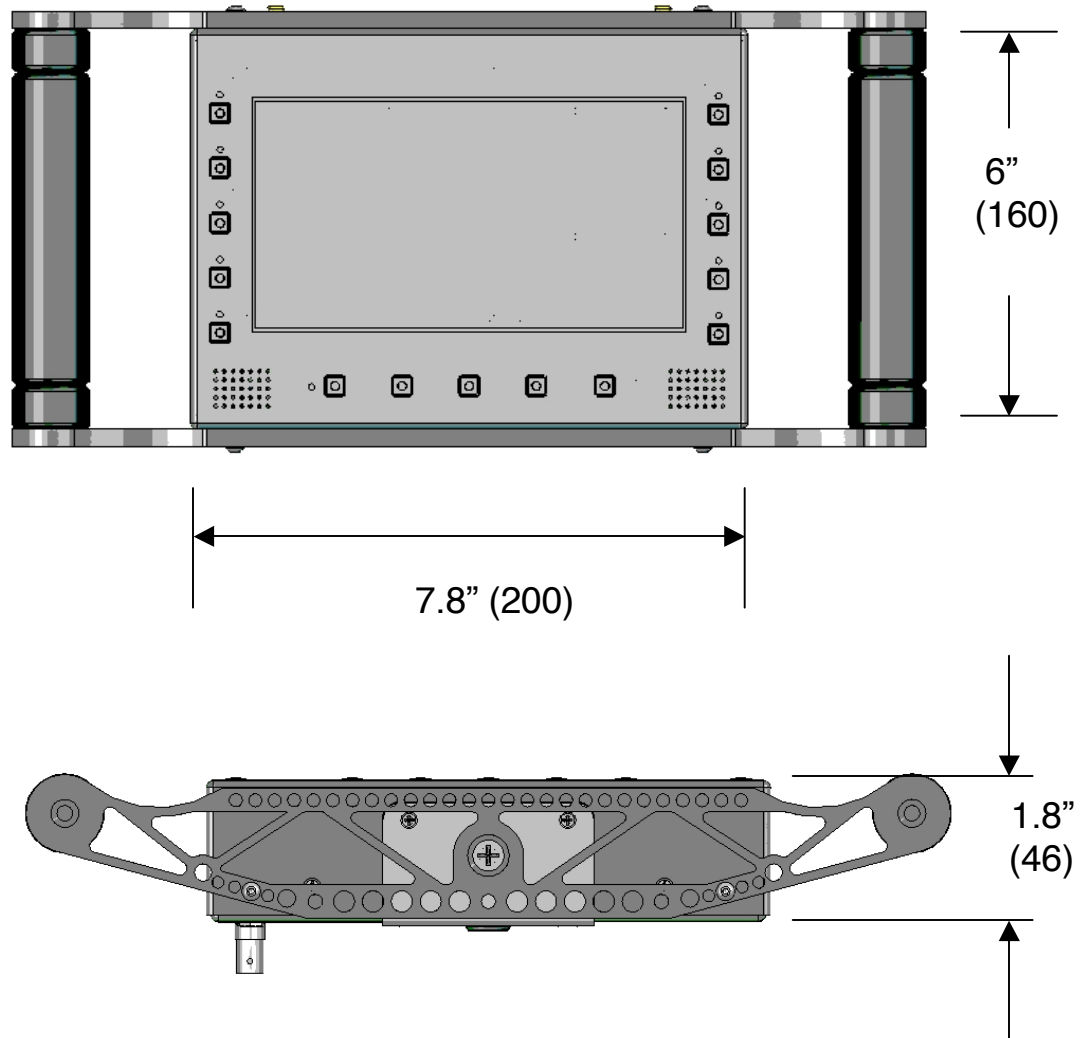


Figure F – OWM602 Mechanical Specifications - Inches [mm]

2.10 Environmental Conditions.

The OWM602 is designed to meet the following environmental conditions:

- | | | |
|----|-----------------------|--|
| a) | Operating temperature | -4° to 122° F
(-20° to 50° C) |
| b) | Storage temperature | -13° to 150° F
(-25° to 65° C) |
| c) | Vibration | 1.5G, from 10Hz to 2KHz, sine wave, three axis |
| d) | Shock | 15G, 25msec, half sine wave, three axis |
| e) | Humidity | 5 to 95%, non-condensing |
| f) | Inclination | Any |
| g) | Altitude | -1500 feet to 15,000 feet
(-450 meter to 4,500 meter) |

3. Operating Instructions

3.1 Human Interface.

3.1.1 Power On/Off (Circle 5 on figure A)

The power on/off switch controls power to the unit. It is an electronic switch & must be kept pressed for 3 sec.

3.1.2 Front Panel Channel Select Switches (Circle 7 & 9 on figure A)

The OWM602 has a provision of 16 channels. The frequencies associated with a channel have been factory programmed but can be changed by the user through the serial RS232 interface. The front panel has a bank of 8 switches to allow quick switching between channels. The channels are numbered 0-F (hexadecimal format wherein A is 10, B is 11 ... F is 15) that correspond to the OTX627 channels. Channels 0-7 are direct selection whereas a second bank select switch selects channels 8-F. The LED corresponding to the channel glows to indicate the selected channel.

3.1.3 Front Panel Indicators (Circles 1 & 8 on figure A).

The OWM602 has 3 sets of indicators-

- a) Power indicator : This red led indicates the unit is powered ON. A brief flash when the 'Power' is pressed indicates that the input voltage is too low for operation. This is called a 'Under-Voltage Lockout'.
- b) Channel indicators (Circle 8): These are yellow led's indicating the selected channel
- c) Bank indicator : This green led when lit indicates that Bank 8-F has been selected.

3.1.4 OSD Menu button (Circle 6 on figure A).

This switch allows the user to enable or disable the 'on-screen display (OSD)'. It has 4 settings as explained later.



3.1.5 MENU button (Circle 2 on figure A)

This button brings up the LCD menu for selection & adjustment of input source & video display.

3.1.6 /ENTER buttons (Circle 3 on figure A)

These buttons allow navigation and selection of the menus.

3.1.7 VOL buttons (Circle 4 on figure A)

The  and  buttons act as volume controls outside the LCD menu.

3.2 **Operating the OWM602.**

The OWM602 has the following user controls/ functions:

3.2.1 Power On/Off

The OWM602 has a electronic on/off switch. The switch must be held pressed for at least 3 sec to turn the unit on or off. This shuts off power to the entire receiver. The on condition is indicated by the power led glowing red.

3.2.2 Channel selection

Select the desired channel by pressing the switch. A tactile feedback gives indication of the switch press. The last channel selected is saved and the unit will power up with the last channel.

3.2.3 Bank Select Switch

This switch has a toggle function. At power on, it will come up in the last state before power off e.g if last channel set was 'A', then CH 3/A & CH 8-F will be 'on' . When the mode is 'on', the green led above it glows' indicating that channel bank 8-F has been selected. Pressing the switch again will turn off this selection.

3.2.4 OSD Menu

The OSD Menu brings up the 'on-screen display'. At power on, the default mode is – OSD OFF. It has 3 modes that it cycles through on each key press – ID mode, Quality mode and OSD OFF.

The factory default setting places OSD only on the LCD panel display for performance/confidence monitoring of the wireless link while the video output (on the rear panel) is unobstructed/clean .

The ID mode is by far the most informative display. It shows the tuned status of the received channel, the channel's frequency & an indication of the rf signal level, together with a signal quality red/green indication.

The message in the 'tuned status' part of the display is as follows:
Tune Failed! – *indicates either the transmitter is off or there is severe interference*

SID (service ID) – *displays the Service ID of the channel*

Note: For the –EC suffix models (with Encryption), this mode is especially useful since it provides specific information. When the unit has 'locked' to a signal with a valid encrypted video, the SID is displayed, otherwise a 'No Services Found' message is displayed. The "No Services Found" message indicates that a lock was established with the received signal but valid data wasn't decoded. This means that either the transmitter is un-encrypted or there is a key mis-match.

Quality mode is more useful to technical or advanced users. It gives a more enhanced display of each of the two antennas input signal levels, the signal quality of each & the combined BER (Bit Error Rate) of the recovered signal. The BER is a measure of the overall quality of the combined signal (from antenna 1 & 2). For MPEG-2, blotchy effect is seen at a BER of about 2×10^{-3} . The typical rf level at this point is around –95 dBm, although other factors like severe multi-path or interference could cause high BER at much higher signal levels. The normal user should only use this, if at all, to judge the cause of poor performance or to get a feel of the locations effects to the wireless link.

OSD OFF mode as it implies does not put any on-screen display. Please note that even though OSD Menu is off, when a channel is changed, there will be a brief OSD for 3 secs, indicating the new channel info, the SID etc. When the lock has been established, the OSD disappears.

3.2.5 LCD Menu and Adjustments

Pressing the MENU button brings up the main LCD menu. The following is a snapshot of the main LCD menu (future versions may have added features with additional menu items):



Navigation through the menu is done with the \triangle and ∇ keys. To modify the selected function, press the ENTER key. A sub menu will open with the current setting highlighted. To change to a different setting, use the \triangle or ∇ key and confirm the selection with ENTER. To exit the menu, press the MENU key. If the current operation is in a sub menu, MENU must be pressed twice to completely exit from the lcd menu. If no key is pressed (within the lcd menu) for more than 15 seconds, the lcd menu disappears from the screen.

Note: After the MENU has been exited, a 'state save' function has been implemented. This takes about 8-10 sec. During this time, the picture will appear frozen. This is not a fault.

The following is a list of available menus and possible selections-

Video Source $\left[\begin{array}{l} \text{Wireless AV} \\ \text{External AV} \end{array} \right.$

Video Format $\left[\begin{array}{l} 16: 9 \\ 4: 3 \end{array} \right.$

Brightness 0 – 63

Contrast 0 – 63

Hue 0 – 63

Saturation 0 – 63

For Brightness, Contrast, Hue and Saturation, the value shown in parantheses () is factory default value

Video Standard ☐ NTSC
 ☐ PAL

NOTE: Selection of the proper standard for display is important. Since this is a digital video display, it is possible to get the picture even when the wrong standard is selected. The result of such an action is seen as part of the PAL picture being cut-off if NTSC standard is selected and a shorter NTSC picture if the PAL standard is selected.

3.2.6 Metadata Usage

The –U suffix provides for user data/metadata to be received from a OTX transmitter. The baudrate is fixed at 19.2Kbps. There is no handshaking and received data will be sent over the RS232 output as received from the transmitter. Since the metadata operation is 1 way, there is only a data output.

Note: Although only the transmit line will be used to send data output from the OWM receiver, the port is enabled **only if the receive line is active** (Mark condition of RS232 typ –5 to –12V). In other words, both Rx & Tx lines of the serial interface must be connected. The cables supplied are wired for direct connection to a pc COM port.

DO NOT send any data to the receiver as it may trigger some diagnostics and require the unit to be powered off and back on.

Please use the supplied cable for connection with a serial port.

3.2.7 Antenna Use

This digital system uses COFDM modulation that gives a great advantage of a robust video link. However, there are differences when compared to a 'traditional analog' video system.

One of the main differences is the input signal level permitted for good signal reception. That directly translates into transmitter power & use of antennas. The OWM602 receiver has excellent sensitivity allowing use of small low profile antennas. High gain antennas on the receiver will increase operating range but also impose a limit on the high-received signal when the transmitter is close to the receiver (if either the transmitter or receiver is mobile). Use of high gain antennas on the receive side and the OTX transmitter in close proximity will saturate the front end of the receiver & result in distortion of the received signal thereby causing errors in reception. If testing in the lab, add attenuators in series with the receiver inputs or reduce the power setting of the OTX transmitter to lower the rf output power.

The OWM602 is meant to be a portable handheld monitor with antennas installed on the equipment. We do not recommend using high gain omni antennas with the OWM602 unless the antennas are low profile (typ < 6" tall) as there is a risk of breaking the antenna connectors.

If the OWM602 is required to be used with cables attached and the antennas placed far away from the unit, please contact us for an external down-converter version.

If you need assistance, please consult Avalon RF for choice & use of antennas.

4. Ordering Information

OWM402 – UHF Receiver

OWM502 – L-band Receiver with Built-in Down Converters

OWM602 – S-band Receiver with Built-in Down Converters

Add suffix:

-U for Metadata/User data @ 19.2Kb/s

-EC for Encryption provision

Every OWM602 comes with the standard features and following accessories:

- 4.1 One OWM02 unit in a ZIPLOCK ESD bag.
- 4.2 One 12V low noise regulated Universal AC adapter for worldwide use (except for country specific plug).
- 4.3 A user manual (the one you're reading).
- 4.4 **Optional features:**

Option 01	Programming cable for RS232 interface. Programming instructions are provided in a separate document only for advanced users.
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Warranty

The Avalon RF Warranty covers Mechanical and Electrical defects for each of the components in your Avalon RF equipment. We will repair or replace the defective part at our cost during the warranty period. Cost is defined as the cost of the component(s) plus our time to install and test the replacement part. Warranty covers parts and labor.

The warranty period is assumed to be 1 Calendar year unless otherwise specified on invoice.

The warranty does not cover failure due to acts of God, failure caused by power outages by the power company, or failure caused by third party components. This includes, but not limited to, earthquakes, flood, electrical storms, power or transformer failure and other acts which are unforeseeable, any component supplied to Avalon RF by the customer or damaged caused to Avalon RF components by customer supplied components.